TOSHIBA

DICOM CONFORMANCE STATEMENT
PRINT SCU(GRAYSCALE)
FOR
IMAGE PROCESSING SYSTEM   : TIWS-001A
IMAGE PROCESSING SOFTWARE : TIWS-001B
ALATOVIEW

(MIICT0021EA)

TOSHIBA CORPORATION

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Table of Contents

1   Introduction

This document is a DICOM Conformance Statement for Toshiba ALATOVIEW(V1.10 or later). It is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details the DICOM Service Classes, Information Objects, and Communication Protocols which are supported by this product.

If the reader is unfamiliar with DICOM, it is recommended that they read the DICOM Specification (referenced below) prior to reading this conformance statement. Also note that this document is formatted according to the DICOM Specification, Part 2: Conformance.

1.1   References

- ACR-NEMA Digital Imaging and Communications in Medicine, DICOM V3.0.

1.2   Definitions

- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.

- **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.

- **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.

- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.

- **Information Object Definition (IOD)** - An IOD is a data model which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.

- **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.

- **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.

- **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.

- **SOP Instance** - A specific occurrence of a Information Object.

- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.

- **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.

1.3   Acronyms, Abbreviations and Symbols

- ACC   American College of Cardiology
- ACR   American College of Radiology
- ASCII   American Standard Code for Information Interchange
- AE   Application Entity
- ANSI   American National Standards Institute
- CEN TC251 Comite Europeen de Normalization - Technical Committee 251 - Medical Informatics
- DICOM   Digital Imaging and Communications in Medicine
- DIMSE   DICOM Message Service Element
- DIMSE-C   DICOM Message Service Element - Composite
- DIMSE-N   DICOM Message Service Element - Normalized
- HIS   Hospital Information System
- HL7   Health Level 7
- IE   Information Entity
- IOD   Information Object Definition
- ISO   International Standards Organization
- JIRA   Japan Industries Association of Radiological Systems
- NEMA   National Electrical Manufacturers Association
- OSI   Open Systems Interconnection
- PDU   Protocol Data Unit
- RIS   Radiology Information System
- SCP   Service Class Provider
- SCU   Service Class User
- SOP   Service-Object Pair
- TCP/IP   Transmission Control Protocol/Internet Protocol
- UID   Unique Identifier

2 Implementation Model

2.1 Application Data Flow Diagram
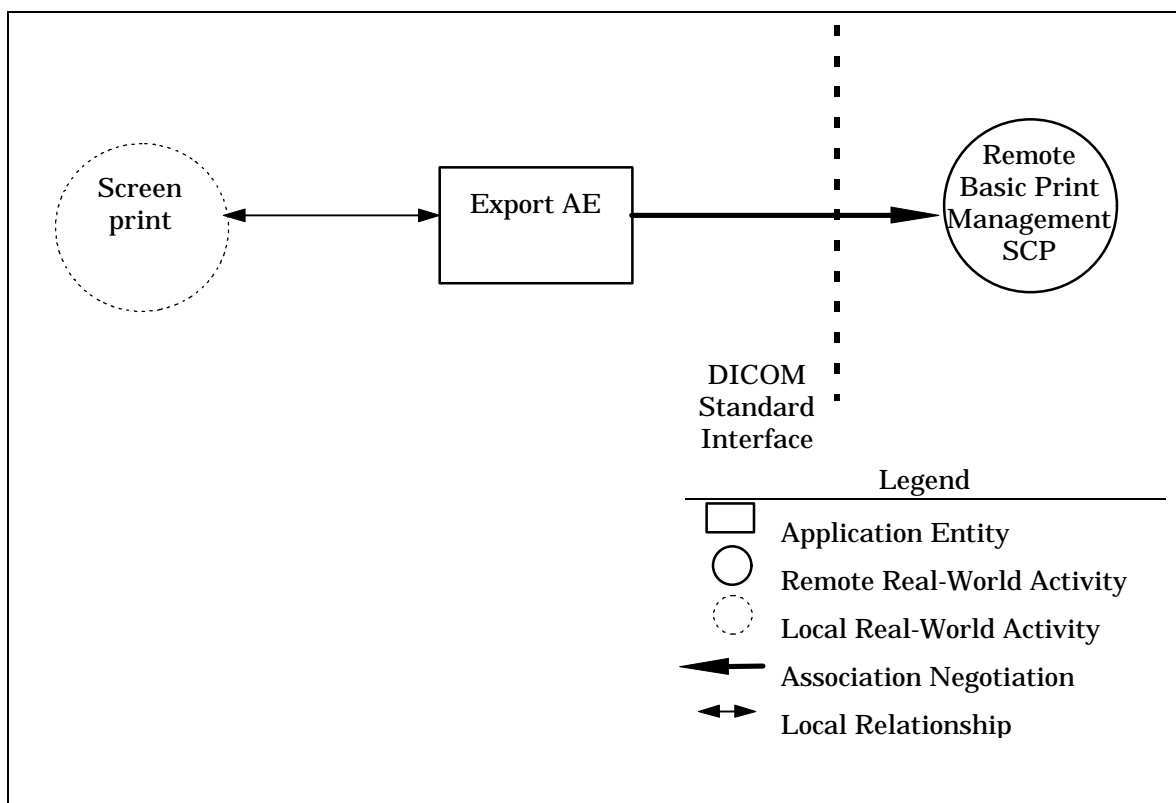
Figure 1

2.2 Functional Definitions of AE's

2.2.1 Export AE

Export AE is used to print images to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM Basic Grayscale Print Objects
- Establishes DICOM Association with remote DICOM device
- Performs transmit of DICOM Basic Grayscale Print Objects to remote DICOM device

2.3   Sequencing of Real World Activities

2.3.1   Features

- Operator requests to send images on monitor.
- When the image transfer fails, an error message window is displayed. The window has Cancel-Button and Retry-Button. If Retry-Button is clicked, the ALATOVIEW attempts to resend the image.

2.3.2   Operation

The operation for screen print request:

Step-1: Display image on monitor.

Step-2: Press the key of screen-print and film-reset.

3   AE Specifications

3.1   Export Specification

Export AE provides Standard Conformance to the following DICOM SOP Classes as an SCU:

Table 1

SOP Class Name	SOP Class UID
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9

The SOP Classes listed in **Table 2** indicate the SOP Classes regulated by the Basic Grayscale Print Management Meta SOP Class.

Table 2

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

3.1.1   Export Association Establishment Policies

3.1.1.1   Export General

Export AE will utilize and understand the following Application Context Name:

Table 3

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Export AE supports a minimum PDU size of 16 Kbytes and a maximum PDU size of 16 Kbytes. The default value is set to 16 Kbytes.

3.1.1.2   Export Number of Associations

Export AE can only establish one association at a time, independent of the number of destinations chosen.

3.1.1.3   Export Asynchronous Nature

Export AE allows a single outstanding operation on any association. Therefore, Export AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.1.1.4 Export Implementation Identifying Information

Export AE will specify the following Implementation Identifying Information:

- **Implementation Class UID**   **<1.2.392.200036.9116.2.2.2>**
- **Implementation Version Name**   **<TM_CT_CMW_V2.00>**

3.1.2   Export Association Initiation by Real-World Activity

Export AE initiates an association when the following activity is chosen by the operator:

- "Screen print"
    - Print - Request print images to a remote DICOM device.

3.1.2.1   Export Real-World Activity - Print

3.1.2.1.1   Export Associated Real-World Activity - Print

Export AE performs request print images manually to destination device.

3.1.2.1.2   Export Proposed Presentation Contexts - Print

Export AE proposes the following Presentation Contexts shown below:

Table 4

Presentation Context Table					
Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.1.3   Export SOP Specific Conformance - Print

Export AE operation involves the following sequence of steps for each request pint image.

(1)   Association establishment (requestor only)

(2)   Request print images (SCU only)

(3)   Association release (requestor only)

Export AE judges that the request printing images succeeded when the result of (2) "Request print images" is "Success" even if the result of (3) "Association release" is "Failure".

SOP Specific Conformance Statement is described in   8 DIMSE-Service and Attributes.

See 8 DIMSE-Service and Attributes.

3.1.3   Export Association Acceptance Policy

Export AE does not accept any associations generated by remote applications.

4 Communication Profiles

4.1 Supported Communication Stacks

This product provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 OSI Stack

Not applicable to this product.

4.3 TCP/IP Stack

This product inherits its TCP/IP stack from the computer system upon which it executes.

4.3.1 API

Not applicable to this product.

4.3.2 Physical Media Support

This product is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

4.4 Point-to-Point Stack

Not applicable to this product.

5   Extensions/Specializations/Privatizations

Not applicable to this product.

6 Configuration

For the ALATOVIEW, the configuration can be set through interaction.

Note: Settings and changes are performed by Toshiba Service Personnel at a time of installation of the ALATOVIEW.

6.1 AE Title/Presentation Address Mapping

Mapping from the AE titles to the presentation addresses is as follows:

- One port number and one AE title can be described for one host name.
- Each AE title is mapped to one port number.

6.2 Configurable Parameters

6.2.1 Time-out Value, Retry Count, Retry Interval

The time-out value, retry count, and retry interval in each status are shown below.

SCU   SCP

Association

TCP connection

Initiation of connection

Association establishment request   S1

Association establishment response
S2

Service request   S3

Service response
S4

Association release request   S3

Association release response
S5

Disconnection
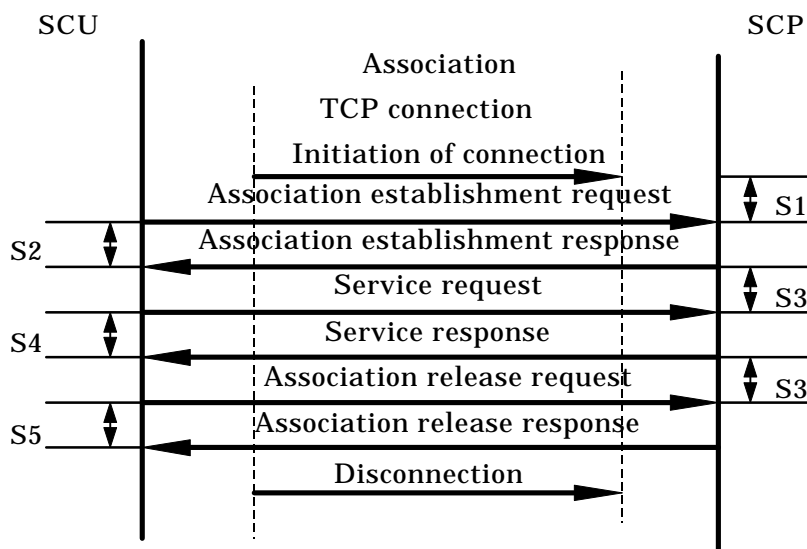
Figure 2

Table 5

Status	Item	Time-out Value	Retry Count	Retry Interval	Remarks
S1	Association establishment request waiting time	Not set	Not set	Not set	Not applicable to this product
S2	Association establishment response waiting time	default: 30 seconds range: 1 to 999999	default: once range: 0 to 99	default: 5 seconds range: 0 to 999999	Only one parameter can be set in the ALATOVIEW
S3	Service request waiting time - Basic Film Session SOP Class - Basic Film Box SOP Class - Basic Grayscale Image Box SOP Class	Not set	Not set	Not set	Not applicable to this product
S4	Service response waiting time - Basic Film Session SOP Class - Basic Film Box SOP Class - Basic Grayscale Image Box SOP Class - Printer SOP Class	default: 180 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the ALATOVIEW
S5	Association release waiting time	default: 5 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the ALATOVIEW

6.2.2 Warning Status Criteria

The warning status criteria can be set for each station and each service.

If SUCCESS is set, the ALATOVIEW judges that the request printing images succeeded.

If FAIL is set, the ALATOVIEW judges that the request printing images failed.

6.2.2.1 Basic Film Session SOP Class

6.2.2.1.1 N-CREATE response

Table 6

Warning response item	Default	Parameter setting range
Memory allocation not supported	FAIL	SUCCESS or FAIL

6.2.2.2 Basic Film Box SOP Class

6.2.2.2.1 N-ACTION responce

Table 7

Warning response item	Default	Parameter setting range
Film Box SOP Instance hierarchy does not cotaion Image Box SOP Instance(empty page)	FAIL	SUCCESS or FAIL

6.2.2.3 Printer SOP Class

6.2.2.3.1 N-Get responce

Table 8

Warning response item	Default	Parameter setting range
One or more Attribute Value were not read because the specified Attribute was not recognized. The Attribute Value that could be read are returned.	FAIL	SUCCESS or FAIL

6.3 Implementation Information and Maximum Reception PDU Size

The default value for the ALATOVIEW are used for the Implementation Class UID, the Implementation Version name, and the Maximum length received.

Table 9

Parameter	Default
Implementation Class UID	<1.2.392.200036.9116.2.2.2>
Implementation Version name	<TM_CT_CMW_V2.00>
Maximum length received(unit:byte)	<16 Kbytes>

6.4   Default Transfer Syntax

In request print images, when two transfer syntax response are received, the ALATOVIEW performs the transfer using the following setting.

Default = "Explicit VR Big Endian"

7 Support of Extended Character Sets

This product supports the following character sets:

- ISO-IR 6 (default)   Basic G0 Set

8 DIMSE-Service and Attributes

The attribute listed in the following tables represent a small set of the possible attributes which could be supported by each services.

8.1 DIMSE-Services

Table 10

SOP Class	DIMSE-Service	Reference	Usage SCU/SCP	Usage
Basic Film Session SOP Class	N-CREATE	8.2.1	M/M	Used
Basic Film Box SOP Class	N-CREATE	8.3.1	M/M	Used
Basic Film Box SOP Class	N-ACTION	-	M/M	Used
Basic Film Box SOP Class	N-DELETE	-	U/M	Used
Basic Grayscale Image Box SOP Class	N-SET	8.4.1	M/M	Used
Printer SOP Class	N-EVENT-REPORT	-	M/M	Used
Printer SOP Class	N-GET	8.5.1	U/M	Used

8.2 Basic Film Session SOP Class

8.2.1 N-CREATE Attributes

Table 11

Attribute name	Tag	Usage SCU/SCP	Attributes
Number of Copies	(2000, 0010)	U/M	Always set. ("1" to "99")
Print Priority	(2000, 0020)	U/M	Always set. ("MED")
Medium Type	(2000, 0030)	U/M	Always set. ("CREAR FILM", "BLUE FILM", "PAPER")
Film Destination	(2000, 0040)	U/M	Always set. ("MAGAZINE", "PROCESSOR")

8.3　Basic Film Box SOP Class

8.3.1　N-CREATE Attributes

Table 12

Attribute name	Tag	Usage SCU/SCP	Attributes
Image Display Format	(2010, 0010)	M/M	Always set. ("STANDARD\C,R", "ROW\C1,C2,..,Cn"(n<=4) , "COL\R1,R2,..,Rn"(n<=4))
Film Orientation	(2010,0040)	U/M	Always set. ("PORTRAIT", "LANDSCAPE")
Film Size ID	(2010,0050)	U/M	Always set. ("8INX10IN", "10INX12IN", "10INX14IN", "11INX14IN", "14INX14IN", "14INX17IN", "24CMX24CM", "24CMX30CM")
Magnification Type	(2010,0060)	U/M	Always set. ("REPLICATE", "BILINEAR", "CUBIC", "NONE")
Smoothing Type	(2010,0080)	U/U	64bytes Maximum, or no set
Border Density	(2010,0100)	U/U	Always set. ("BLACK", "WHITE")
Empty Image Density	(2010,0110)	U/U	Always set. ("BLACK", "WHITE")
Min Density	(2010,0120)	U/U	0 to 9999, or not set.
Max Density	(2010,0130)	U/M	0 to 9999, or not set.
Trim	(2010,0140)	U/U	Always set. ("YES", "NO")
Configuration Information	(2010,0150)	U/M	64bytes Maximum, or not set.
Referenced Film Session Sequence	(2010, 0500)	M/M	Always set.
>Referenced SOP Class UID	(0008,1150)	M/M	Always set.
>Referenced SOP Instance UID	(0008,1155)	M/M	Always set.
Referenced Image Box Sequence	(2010,0510)	-/M	
>Referenced SOP Class UID	(0008,1150)	-/M	
>Referenced SOP Instance UID	(0008,1155)	-/M	

8.4

8.4   Basic Grayscale Image Box SOP Class

8.4.1   N-SET Attributes

Table 13

Attribute name	Tag	Usage SCU/SCP	Attributes
Image position	(2020, 0010)	M/M	Always set. (1 to 36)
Polarity	(2020, 0020)	U/M	Always set. ("NORMAL", "REVERSE")
Magnification Type	(2010, 0060)	U/U	Always set. ("REPLICATE", "BILINEAR" "CUBIC", "NONE")
Smoothing Type	(2010, 0080)	U/U	64bytes maximum, or no set.
Preformatted Grayscale Image Sequence	(2020, 0110)	M/M	Always set.
>Samples Per Pixel	(0028, 0002)	M/M	Always set. (1)
>Photometric Interpretation	(0028, 0004)	M/M	Always set. ("MONOCHROME2")
>Rows	(0028, 0010)	M/M	Always set.
>Columns	(0028, 0011)	M/M	Always set.
>Pixel Aspect Ratio	(0028, 0034)	M/M	Always set. ("1\1")
>Bits Allocated	(0028, 0100)	M/M	Always set. (8)
>Bits Stored	(0028, 0101)	M/M	Always set. (8)
>High Bit	(0028, 0102)	M/M	Always set. (7)
>Pixel Representation	(0028, 0103)	M/M	Always set. (0)
>Pixel Data	(7FE0, 0010)	M/M	Always set.

8.5   Printer SOP Class

8.5.1   N-GET Attributes

E

Table 14

Attribute name	Tag	Usage SCU/SCP	Attributes
Printer Status	(2110,0010)	U/M	
Printer Status Info	(2110,0020)	U/M	
Printer Name	(2110,0030)	U/M	